What is Claimed:

1. A semiconductor device comprising:

a substrate having a first thermal expansion coefficient; and

an organic semiconductor material coupled to the substrate at an interface therebetween, the organic semiconductor material having a second thermal expansion coefficient that is different from the first thermal expansion coefficient, whereby a mechanical stress is transferred from the substrate to the organic semiconductor material through the interface, the mechanical stress being related to the difference between the first thermal expansion coefficient and the second thermal expansion coefficient.

2. The semiconductor device of claim 1 wherein the mechanical stress is a compressive stress transferred from the substrate to the organic semiconductor material through the interface.

3. The semiconductor device of claim 2 wherein the compressive stress decreases a distance between adjacent molecules in the organic semiconductor material, thereby increasing carrier mobility of the organic semiconductor material.

4. The semiconductor device of claim 1 wherein the mechanical stress is a tensile stress transferred from the substrate to the organic semiconductor material through the interface.

5. The semiconductor device of claim 4 wherein the tensile stress increases a distance between adjacent molecules in the organic semiconductor material, thereby decreasing carrier mobility of the organic semiconductor material.

6. A method of fabricating a semiconductor device comprising:

providing a substrate having a first thermal expansion coefficient;

coupling an organic semiconductor material to the substrate at an interface therebetween, the organic semiconductor material having a second thermal expansion coefficient different from the first thermal expansion coefficient; and

applying a mechanical stress to the organic semiconductor material through the interface by varying a temperature of the substrate such that the substrate changes in at least one physical dimension.

7. The method of claim 6 wherein the applying step includes applying a compressive stress to the organic semiconductor material through the interface.

8. The method of claim 7 further comprising the step of decreasing a distance between adjacent molecules in the organic semiconductor material, thereby increasing carrier mobility of the organic semiconductor material.

9. The method of claim 6 wherein the applying step includes applying a tensile stress to the organic semiconductor material through the interface.

10. The method of claim 9 further comprising the step of increasing a distance between adjacent molecules in the organic semiconductor material, thereby decreasing carrier mobility of the organic semiconductor material.

11. A semiconductor device comprising:

a substrate;

an organic semiconductor material coupled to the substrate at an interface therebetween; and

an actuator provided for use with at least one of the substrate or the organic semiconductor, the actuator being selected from the group comprising piezoelectric actuators, piezomagnetic actuators, electrostrictive actuators, magnetostrictive actuators, electrostatic actuators, magnetostatic actuators, shape memory alloy actuators, magnetic shape memory alloy actuators, and electroactive polymer actuators, the actuator applying

a mechanical force to at least one of the substrate or the organic semiconductor upon the actuator being actuated, the mechanical force varying a carrier mobility of the organic semiconductor.

12. The semiconductor device of claim 11 wherein the mechanical force is a compressive stress, the compressive stress decreasing a distance between adjacent molecules in the organic semiconductor material, thereby increasing carrier mobility of the organic semiconductor material.

13. The semiconductor device of claim 11 wherein the mechanical force is a tensile stress, the tensile stress increasing a distance between adjacent molecules in the organic semiconductor material, thereby decreasing carrier mobility of the organic semiconductor material.

14. The semiconductor device of claim 11 wherein the actuator is integrated into at least one of the substrate or the organic semiconductor material.

15. A method of fabricating a semiconductor device comprising:

providing an organic semiconductor material coupled to a substrate;

providing an actuator for use with at least one of the substrate or the organic semiconductor material, the actuator being selected from the group comprising piezoelectric actuators, piezomagnetic actuators, electrostrictive actuators, magnetostrictive actuators, electrostatic actuators, magnetostatic actuators, shape memory alloy actuators, magnetic shape memory alloy actuators, and electroactive polymer actuators; and

applying a mechanical force to at least one of the substrate or the organic semiconductor material by actuating the actuator, the mechanical force varying a carrier mobility of the organic semiconductor material.

16. The method of claim 15 wherein said applying step includes applying a compressive stress to at least one of the substrate or the organic semiconductor material

by actuating the actuator, the compressive stress decreasing a distance between adjacent molecules in the organic semiconductor material, thereby increasing carrier mobility of the organic semiconductor material.

17. The method of claim 15 wherein said applying step includes applying a tensile stress to at least one of the substrate or the organic semiconductor material by actuating the actuator, the tensile stress increasing a distance between adjacent molecules in the organic semiconductor material, thereby decreasing carrier mobility of the organic semiconductor material.

18. The method of claim 15 wherein said coupling step includes integrating the actuator into at least one of the substrate or the organic semiconductor material.

19. A semiconductor device comprising:

a semiconductor package; and

an organic semiconductor material provided within the semiconductor package, the semiconductor package having a hydrostatic pressure applied thereto such that the pressure within the semiconductor package is different from atmospheric pressure, the applied hydrostatic pressure varying carrier mobility of the organic semiconductor material.

20. The semiconductor device of claim 19 wherein the hydrostatic pressure applies a compressive stress to the organic semiconductor material, the compressive stress decreasing a distance between adjacent molecules in the organic semiconductor material, thereby increasing carrier mobility of the organic semiconductor material.

21. The semiconductor device of claim 19 wherein the hydrostatic pressure applies a tensile stress to the organic semiconductor material, the tensile stress increasing a distance between adjacent molecules in the organic semiconductor material, thereby decreasing carrier mobility of the organic semiconductor material.

22. The semiconductor device of claim 19 wherein the hydrostatic pressure is provided by at least one of gaseous pressure, liquid pressure, gel pressure, solid pressure, or a combination thereof.

23. A method of fabricating a semiconductor device comprising:

providing an organic semiconductor material in a semiconductor package; and

applying a hydrostatic pressure to the semiconductor package such that the pressure within the semiconductor package is different from atmospheric pressure, the applied hydrostatic pressure varying carrier mobility of the organic semiconductor material.

24. The method of claim 23 wherein said applying step includes applying, through the hydrostatic pressure, a compressive stress to the organic semiconductor material, the compressive stress decreasing a distance between adjacent molecules in the organic semiconductor material, thereby increasing carrier mobility of the organic semiconductor material.

25. The method of claim 23 wherein said applying step includes applying, through the hydrostatic pressure, a tensile stress to the organic semiconductor material, the tensile stress increasing a distance between adjacent molecules in the organic semiconductor material, thereby decreasing carrier mobility of the organic semiconductor material.

26. The method of claim 23 wherein said applying step includes applying at least one of gaseous pressure, liquid pressure, gel pressure, solid pressure, or a combination thereof into the semiconductor package.